

NLG5_CAN Spec 2.01

Introduction

This specification describes the CAN Bus interface for the NLG5.

The NLG5-CAN matrix 2.0 is valid for all NLG5 classes.

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CAN definitions

Bitrate: 500 kbit/s

standard Frame used

CAN 2.0B specifications

Data format and range definitions

Data order, as sent in a message: Bit 15...7...0 = MSB...LSB, Byte 0 ... Byte 7, high byte in a word first, high word in a long first. (Motorola)

Used data types in this document are bits, bitmaps and analog signals (signed word).

Bits are first assembled to bitmaps, then their location in the message is defined.

Every analog value has a valid range in which the receiving controller hasn't any data format problems.

Error and warning definitions & handling:

Error definition: Errors will result in full performance loss. There are 3 categories of errors:

1. latched errors which can be cleared by the command bit
2. reversible errors
3. errors which can only be cleared by system reset

Warning definition: Warnings may indicate reduction of performance by internal problems or loss of performance caused by external influence

General settings of the NLG5

The general settings like activation of the external battery temperature sensors or adjustment of protective limits can be done by the PC software ChargeStar

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Views		Naming			Loc.			Definition				Message loss strategy			Comments	
Default order	Level	Rx, Tx	Message Name	Short Name	Used in CAN Bus	ID	DLC	Transmit Time [ms]	Max. Delay time [ms]	Msg Loss Time [ms]	No message after init	Message lost after Communication	Message Communication Restored	Comments		
			Analog Signal / Bitmap Name	Short Name	Used in Message	Start Byte	Start Bit	Byte Length	Valid range (physical)	Resolution	Unit	Sign Definitions	Default / Init Value	Error Value	Error probable Cause	Comments
			Bit Name	Short Name	Used in Bitmap	Start Byte	Start Bit	Bit Length	Value Definition				Default / Init Value			Comments
Filters																
1.0	Msg	Rx	NLG5 Control	NLG5_CTL		618h	7	100	20	300	No Operation	No Operation	No Operation			
2.0	Sig	Rx	NLG5 Control Bitmap	NLG5_CTLB	NLG5_CTL	0	0	1			0					
3.0	Bit	Rx	CAN enable	NLG5_C_C_EN	NLG5_CTLB	0	7	1			0 = Disable, 1 = Enable			if CAN enable and power enable are active and no error occurs, the NLG5 is ready for charging		
4.0	Bit	Rx	Clear error latch	NLG5_C_C_EL	NLG5_CTLB	0	6	1			0->1 = Clear error latch			Error should only be cleared, when command values are zero		
5.0	Bit	Rx	Control pilot ventilation request	NLG5_C_CP_V	NLG5_CTLB	0	5	1			0 = No Ventilation, 1 = Ventilation			relevant only at a corresponding control pilot socket		
6.0	Sig	Rx	Mains current maximum	NLG5_MC_MAX	NLG5_CTL	1	0	2	0...50	0.1	A	N/A	N/A			
7.0	Sig	Rx	Output voltage command	NLG5_OV_COM	NLG5_CTL	3	0	2	0...1000	0.1	V	N/A	N/A			
8.0	Sig	Rx	Output current command	NLG5_OC_COM	NLG5_CTL	5	0	2	0...150	0.1	A	N/A	N/A			
9.0	Msg	Tx	NLG5 Status	NLG5_ST		610h	4	100								
10.0	Sig	Tx	NLG5 Status Bitmap	NLG5_STB	NLG5_ST	0	0	4								
11.0	Bit	Tx	NLG5 power enable	NLG5_S_HE	NLG5_STB	0	7	1			0 = Disable, 1 = Enable			Indicates if the Hardware enable Pin is active		
12.0	Bit	Tx	NLG5 general error latch	NLG5_S_ERR	NLG5_STB	0	6	1			0 = No Error, 1 = Error/failure latched			Indicates that a failure has occurred which disables charging process. FAULT LED ON		
13.0	Bit	Tx	NLG5 general limit warning	NLG5_S_WAR	NLG5_STB	0	5	1			0 = No Warning, 1 = Warning active			Indicates that a warning condition is present which can limit performance. FAULT LED is blinking		
14.0	Bit	Tx	NLG5 Fan active	NLG5_S_FAN	NLG5_STB	0	4	1			0 = Fan off, 1 = Fan on					
15.0	Bit	Tx	Europe mains (230V/50Hz)	NLG5_S_EUM	NLG5_STB	0	3	1			1 = Europe mains detected					
16.0	Bit	Tx	USA mains LEVEL I, 120V/12A/60Hz	NLG5_S_UM_I	NLG5_STB	0	2	1			1 = USA mains level I detected					
17.0	Bit	Tx	USA mains LEVEL II, 240V/32A/60Hz	NLG5_S_UM_II	NLG5_STB	0	1	1			1 = USA mains level II detected					
18.0	Bit	Tx	Control pilot detected	NLG5_S_CP_DT	NLG5_STB	0	0	1			0 = Not Detected, 1 = Detected					
19.0	Bit	Tx	Bypass detection I	NLG5_S_BPD_I	NLG5_STB	1	7	1			00= no Bypass detected, 01= DC bypass detected			Information about the 2nd NLG5 block		
20.0	Bit	Tx	Bypass detection II	NLG5_S_BPD_II	NLG5_STB	1	6	1			10= AC bypass in phase, 11= AC bypass not in phase			Information about the 2nd NLG5 block		
21.0	Bit	Tx	Limitation by output voltage	NLG5_S_L_OV	NLG5_STB	1	5	1			0 = Disable, 1 = Enable					
22.0	Bit	Tx	Limitation by output current	NLG5_S_L_OC	NLG5_STB	1	4	1			0 = Disable, 1 = Enable					
23.0	Bit	Tx	Limitation by mains current	NLG5_S_L_MC	NLG5_STB	1	3	1			0 = Disable, 1 = Enable					
24.0	Bit	Tx	Limitation by power indicator	NLG5_S_L_PI	NLG5_STB	1	2	1			0 = Disable, 1 = Enable					
25.0	Bit	Tx	Limitation by control pilot	NLG5_S_L_CP	NLG5_STB	1	1	1			0 = Disable, 1 = Enable					
26.0	Bit	Tx	Limitation by NLG5 maximum power	NLG5_S_L_PMAX	NLG5_STB	1	0	1			0 = Disable, 1 = Enable			max. mains power that NLG5 can handle (3.7kW) is reached		
27.0	Bit	Tx	Limitation by NLG5 maximum mains current	NLG5_S_L_MC_MAX	NLG5_STB	2	7	1			0 = Disable, 1 = Enable			max. mains current that NLG5 can handle (16A) is reached		
28.0	Bit	Tx	Limitation by NLG5 maximum output current	NLG5_S_L_OC_MAX	NLG5_STB	2	6	1			0 = Disable, 1 = Enable			depends on the NLG5 model		
29.0	Bit	Tx	Limitation by NLG5 maximum output voltage	NLG5_S_L_MO_MAX	NLG5_STB	2	5	1			0 = Disable, 1 = Enable			depends on the NLG5 model		
30.0	Bit	Tx	Limitation by temperature Capacitors prim.	NLG5_S_L_T_CPRIM	NLG5_STB	2	4	1			0 = Disable, 1 = Enable			temperature derating characteristic: T(0A)= 93°C, gradient = -1A/°C		
31.0	Bit	Tx	Limitation by temperature power stage	NLG5_S_L_T_POW	NLG5_STB	2	3	1			0 = Disable, 1 = Enable			temperature derating characteristic: T(0A)= 120°C, gradient = -3A/°C		
32.0	Bit	Tx	Limitation by temperature diodes	NLG5_S_L_T_DIO	NLG5_STB	2	2	1			0 = Disable, 1 = Enable			temperature derating characteristic: T(0A)= 110°C, gradient = -2A/°C		
33.0	Bit	Tx	Limitation by temperature transformer	NLG5_S_L_T_TR	NLG5_STB	2	1	1			0 = Disable, 1 = Enable			temperature derating characteristic: T(0A)= 135°C, gradient = -3A/°C		
34.0	Bit	Tx	Limitation by battery temperature	NLG5_S_L_T_BATT	NLG5_STB	2	0	1			0 = Disable, 1 = Enable					
35.0	Msg	Tx	NLG5 Actual Values I	NLG5_ACT_I		611h	8	100								
36.0	Sig	Tx	Mains current actual	NLG5_MC_ACT	NLG5_ACT_I	0	0	2	0...50	0.01	A			plausibility error		
37.0	Sig	Tx	Mains voltage actual	NLG5_MV_ACT	NLG5_ACT_I	2	0	2	0...500	0.1	V			plausibility error		
38.0	Sig	Tx	Output voltage actual	NLG5_OV_ACT	NLG5_ACT_I	4	0	2	0...1000	0.1	V			plausibility error		
39.0	Sig	Tx	Output current actual	NLG5_OC_ACT	NLG5_ACT_I	6	0	2	0...150	0.01	A			plausibility error		
40.0	Msg	Tx	NLG5 Actual Values II	NLG5_ACT_II		612h	8	100								
41.0	Sig	Tx	Mains current maximum by control pilot	NLG5_S_MC_M_CP	NLG5_ACT_II	0	0	2	0...100	0.1	A			no value		
42.0	Sig	Tx	Mains current maximum by power indicator	NLG5_S_MC_M_PI	NLG5_ACT_II	2	0	1	0...20	0.1	A			external potentiometer for manual power reduction		
43.0	Sig	Tx	Auxiliary battery voltage	NLG5_ABV	NLG5_ACT_II	3	0	1	0...25	0.1	V			no value		
44.0	Sig	Tx	Ampere hours by external shunt	NLG5_AHC_EXT	NLG5_ACT_II	4	0	2	327.68...-327.67	0.01	Ah			balance of charged and discharged amp hours, only available if counting shunt is connected (BRUSA accessory)		
45.0	Sig	Tx	Output current of booster	NLG5_OC_BO	NLG5_ACT_II	6	0	2	0...50	0.01	A			no value		
46.0	Msg	Tx	NLG5 Temp Feedback	NLG5_TEMP		613h	8	1000								
47.0	Sig	Tx	Power stage temperature	NLG5_P_TMP	NLG5_TEMP	0	0	2	-40...+300	0.1	°C			sensor defect, sensor short circuit or not present		
48.0	Sig	Tx	Temperature extern 1	NLG5_TMP_EXT1	NLG5_TEMP	2	0	2	-40...+300	0.1	°C			sensor defect, sensor short circuit or not present		
49.0	Sig	Tx	Temperature extern 2	NLG5_TMP_EXT2	NLG5_TEMP	4	0	2	-40...+300	0.1	°C			sensor defect, sensor short circuit or not present		
50.0	Sig	Tx	Temperature extern 3	NLG5_TMP_EXT3	NLG5_TEMP	6	0	2	-40...+300	0.1	°C			sensor defect, sensor short circuit or not present		
51.0	Msg	Tx	NLG5 Errors/Warnings	NLG5_ERR		614h	5	1000						Send on change, when error / warning occurs or error / warning quits, Send cyclic if any error / warning is active		
52.0	Sig	Tx	NLG5 Error/Warning Bitmap	NLG5_ERRB	NLG5_ERR	0	0	4								
53.0	Bit	Tx	Output overvoltage	NLG5_E_OOV	NLG5_ERRB	0	7	1			1= Error occured or latched			error can only be cleared by system reset		
54.0	Bit	Tx	Mains overvoltage II	NLG5_E_MOV_II	NLG5_ERRB	0	6	1			1= Error occured or latched					
55.0	Bit	Tx	Mains overvoltage I	NLG5_E_MOV_I	NLG5_ERRB	0	5	1			1= Error occured or latched					
56.0	Bit	Tx	Power stage short circuit condition	NLG5_E_SC	NLG5_ERRB	0	4	1			1= Error occured or latched			error can only be cleared by system reset		
57.0	Bit	Tx	Plausibility output voltage measurement	NLG5_E_P_OM	NLG5_ERRB	0	3	1			1= Error occured or latched					
58.0	Bit	Tx	Plausibility mains voltage measurement	NLG5_E_P_MV	NLG5_ERRB	0	2	1			1= Error occured or latched					
59.0	Bit	Tx	Output fuse defect	NLG5_E_OF	NLG5_ERRB	0	1	1			1= Error occured or latched					
60.0	Bit	Tx	Mains fuse defect	NLG5_E_MF	NLG5_ERRB	0	0	1			1= Error occured or latched					
61.0	Bit	Tx	Battery polarity	NLG5_E_B_P	NLG5_ERRB	1	7	1			1= Error occured or latched			error can only be cleared by system reset		
62.0	Bit	Tx	Temp. Sensor capacitors prim.	NLG5_E_T_C	NLG5_ERRB	1	6	1			1= Error occured or latched			sensor defect, sensor short circuit or not present		
63.0	Bit	Tx	Temp. Sensor power stage prim.	NLG5_E_T_POW	NLG5_ERRB	1	5	1			1= Error occured or latched			sensor defect, sensor short circuit or not present		
64.0	Bit	Tx	Temp. Sensor diodes	NLG5_E_T_DIO	NLG5_ERRB	1	4	1			1= Error occured or latched			sensor defect, sensor short circuit or not present		
65.0	Bit	Tx	Temp. Sensor transformer	NLG5_E_T_TR	NLG5_ERRB	1	3	1			1= Error occured or latched			sensor defect, sensor short circuit or not present		
66.0	Bit	Tx	Temp. Sensor extern 1	NLG5_E_T_EXT1	NLG5_ERRB	1	2	1			1= Error occured or latched			sensor defect, sensor short circuit or not present - if enabled		
67.0	Bit	Tx	Temp. Sensor extern 2	NLG5_E_T_EXT2	NLG5_ERRB	1	1	1			1= Error occured or latched			sensor defect, sensor short circuit or not present - if enabled		
68.0	Bit	Tx	Temp. Sensor extern 3	NLG5_E_T_EXT3	NLG5_ERRB	1	0	1			1= Error occured or latched			sensor defect, sensor short circuit or not present - if enabled		
69.0	Bit	Tx	Flash check sum failure	NLG5_E_F_CRC	NLG5_ERRB	2	7	1			1= Error occured or latched					
70.0	Bit	Tx	NVSRAM check sum failure	NLG5_E_NV_CRC	NLG5_ERRB	2	6	1			1= Error occured or latched					
71.0	Bit	Tx	EEPROM SYS check sum failure	NLG5_E_ES_CRC	NLG5_ERRB	2	5	1			1= Error occured or latched					
72.0	Bit	Tx	EEPROM POW check sum failure	NLG5_E_EP_CRC	NLG5_ERRB	2	4	1			1= Error occured or latched					
73.0	Bit	Tx	Watchdog internal	NLG5_E_WDT	NLG5_ERRB	2	3	1			1= Error occured or latched					
74.0	Bit	Tx	Initialization	NLG5_E_INIT	NLG5_ERRB	2	2	1			1= Error occured or latched			Any detectable error during init		
75.0	Bit	Tx	CAN timeout	NLG5_E_C_TO	NLG5_ERRB	2	1	1			1= Error occured or latched			No CAN command message received for more than 300ms		
76.0	Bit	Tx	CAN OFF	NLG5_E_C_OFF	NLG5_ERRB	2	0	1			1= Error occured or latched			Transmit buffer of the CAN controller is > 255		
77.0	Bit	Tx	CAN transmit	NLG5_E_C_TX	NLG5_ERRB	3	7	1			1= Error occured or latched			Transmit buffer of the CAN controller is > 127		
78.0	Bit	Tx	CAN receive	NLG5_E_C_RX	NLG5_ERRB	3	6	1			1= Error occured or latched			Receive buffer of the CAN controller is > 127		
79.0	Bit	Tx	Shutdown threshold Battery temperature	NLG5_E_SDT_BT	NLG5_ERRB	3	5	1			1= Error occured or latched			emergency shutdown - battery temperature exceeds protective limit - error can only be cleared by system reset		

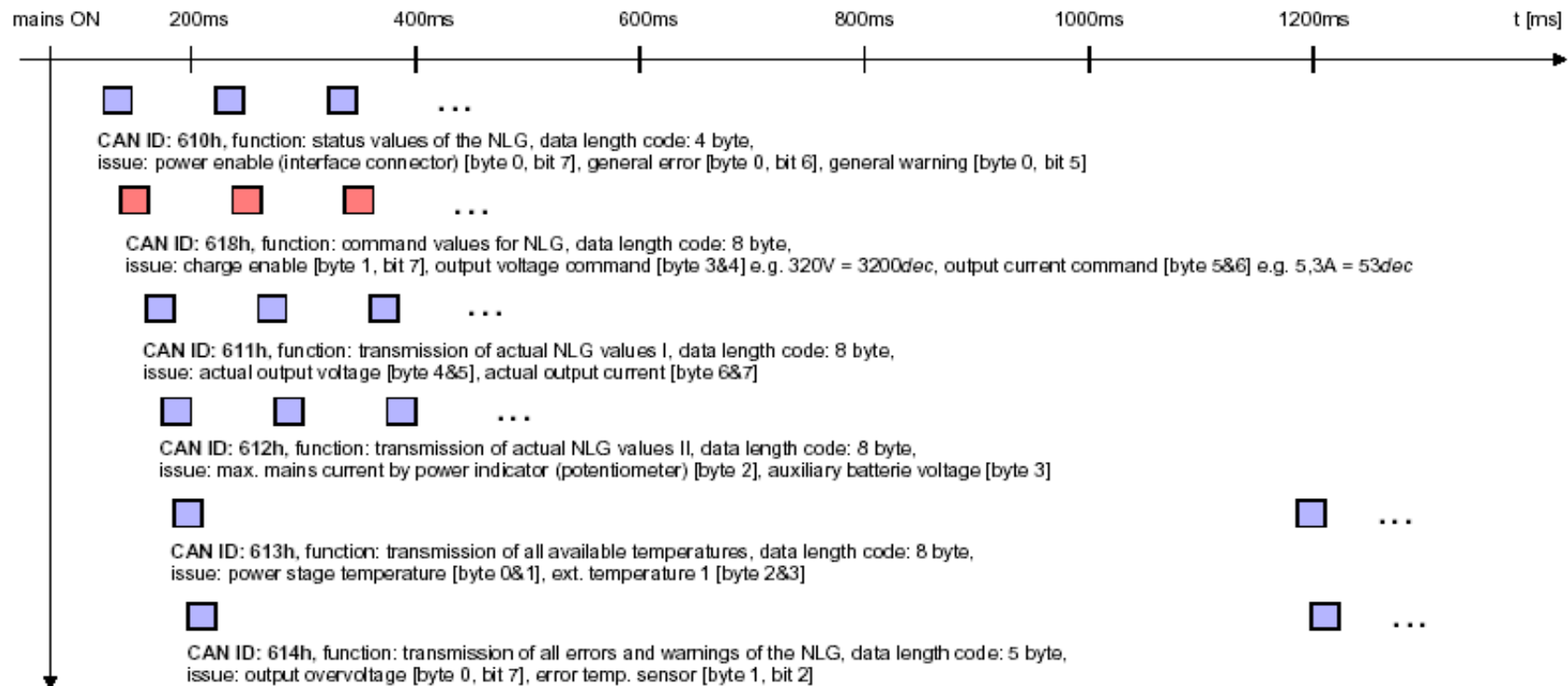
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80.0	Bit	Tx	Shutdown threshold Battery voltage	NLG5_E_SDT_BV	NLG5_ERRB	3	4	1	1= Error occurred or latched	0		emergency shutdown - battery voltage exceeds protective limit - error can only be cleared by system reset
81.0	Bit	Tx	Shutdown threshold Battery ampere hours	NLG5_E_SDT_AH	NLG5_ERRB	3	3	1	1= Error occurred or latched	0		emergency shutdown - battery ampere hours exceeds protective limit - error can only be cleared by system reset
82.0	Bit	Tx	Shutdown threshold charging time	NLG5_E_SDT_CT	NLG5_ERRB	3	2	1	1= Error occurred or latched	0		emergency shutdown - charging time exceeds protective limit - error can only be cleared by system reset
83.0	Sig	Tx	NLG5 Warning Bitmap	NLG5_WRNB	NLG5_ERR	4	0	1		0		
84.0	Bit	Tx	Power limitation by low mains voltage	NLG5_W_PL_MV	NLG5_WRNB	4	7	1	1= Warning active	0		
85.0	Bit	Tx	Power limitation by low battery voltage	NLG5_W_PL_BV	NLG5_WRNB	4	6	1	1= Warning active	0		
86.0	Bit	Tx	Power limitation by internal overtemperature	NLG5_W_PL_IT	NLG5_WRNB	4	5	1	1= Warning active	0		
87.0	Bit	Tx	Command value out of range	NLG5_W_C_VOR	NLG5_WRNB	4	4	1	1= Warning active	0		This warning occurs if the command values are out of the specified ranges. The command value is automatically set to the max. or min. allowed value.

The following overview shows how to start charging with a CAN controlled NLG5:

- 1) connect the unit as required
- 2) make sure that "Power On" signal is supplied (pin3 PON of control connector, usually connected to pin2 AUX)
- 3) send CAN command msg 618h about every 100ms, at least every 300ms. Set CAN enable bit to 1, provide appropriate values for mains current maximum, output voltage command and output current command.

NLG5 CAN communication overview



■	CAN message from NLG5 to Battery Management System (BMS)	data transfer rate: 500 kbit/s	 <i>Competence in Power Electronics Development Research Consulting</i>
■	CAN message from BMS to the NLG5	CAN 2.0B standard	

Version	Date	Changes
2.01	28.03.03	CAN functionality unchanged, only documentation: minor changes of "General" text and typos; QuickStart section appended